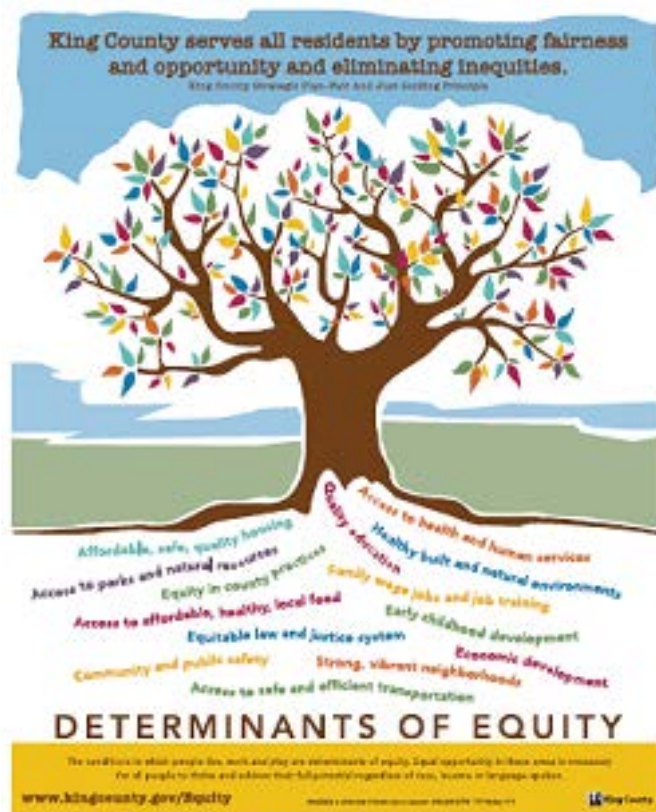


Lower Duwamish Waterway Cleanup Plan Equity Impact Review

August 30, 2013
FINAL DRAFT



King County

Department of
Natural Resources and Parks
Wastewater Treatment Division

For comments or questions, contact:
Richard Gelb
King County Department of Natural Resources and Parks
201 S. Jackson St.
KSC-NR-0700
Seattle, WA 98104-3855
206-296-8374
Richard.Gelb@kingcounty.gov

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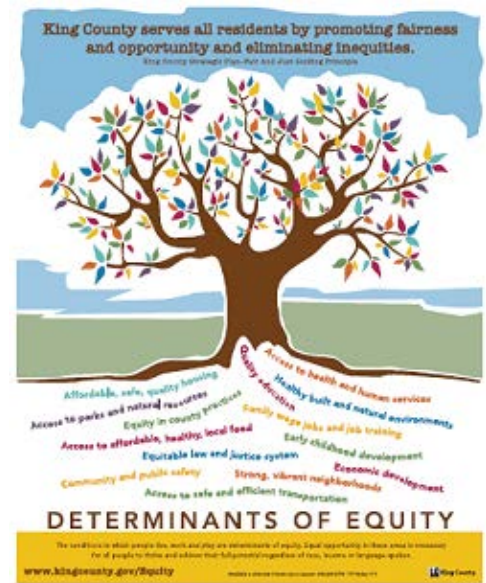
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Purpose

This analysis presents the degree that Lower Duwamish Waterway (LDW) clean up actions will likely bear on selected ‘determinants of equity’ for those who live and work in the LDW adjacent to the cleanup activities and those who depend on or utilize the river for fishing and recreation. It intends to ‘bring an equity lens’ to the primary clean up technologies that are being proposed, so the intensity and duration of impact to food systems, air pollutant generation, ecological and fiscal impacts can be considered as the cleanup plan is being finalized.

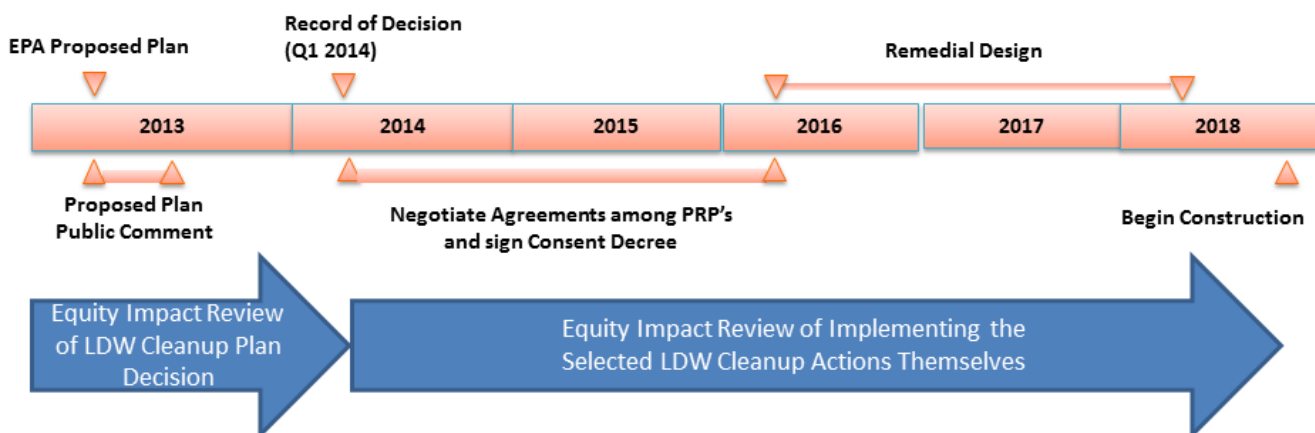
Scope and limitations

This analysis is conceptually similar to a Health Impact Assessment (HIA) (Bhatia 2011) in that it uses a ‘pathway of impact’ framework, though rather than tracing actions to (intended or unintended) health outcomes like a HIA, this Equity Impact Review (EIR) traces actions to (intended or unintended) equity outcomes. In this case, the equity and social justice outcomes considered are consistent with King County’s Equity and Social Ordinance, which guides King County agencies to improve access to 14 determinants of equity.



However, as this EIR effort relies exclusively on secondary data in the Lower Duwamish Waterway Feasibility Study (AECOM 2012) and an economic study (ECONorthwest 2010a, b), the determinants considered were only those where there is a clear and traceable pathway to key actions in the cleanup plan. While there was some consideration given to source control actions, those are not yet clearly defined, so they have not been fully considered in this EIR. A select few equity outcomes clearly bear on determinants of equity, and the degree of impact could be determined from data that exists in the Feasibility Study and economic study.

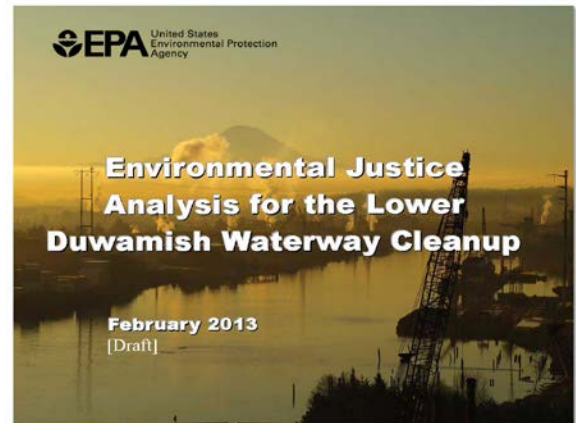
This EIR assesses the equity implications at the decision phase of the project only; not the implementation phase (blue arrows in timeline below). It assesses the effect the action (the decision of selecting which alternative should become the cleanup plan) has on equity outcomes to bring an equity perspective to this phase of activity. It does not address effects on equity outcomes associated with implementing the action once selected. Those implications will be assessed later as follow-up analysis, once the plan has defined the action.



An additional limitation of this effort is that it relies on secondary findings (from other studies) as a basis for identifying community conditions of concern. This was deemed appropriate, given the recent published efforts of several community-based organizations, who had recently conducted thorough community engagement to determine their public health and environmental improvement priorities.

Background

There are two communities, South Park and Georgetown, which are located next to the waterway. These communities are generally recognized as having disproportionately high pollution burdens, lower income levels compared to greater Seattle area, and lower levels of several types of community amenities. These findings were also noted in two recently released reports: 1) *EPA's Environmental Justice Analysis for the Lower Duwamish Waterway Cleanup* (EPA 2013a) and 2) *Cumulative Health Impact Analysis (CHIA)* (Gould and Cummings 2013). The CHIA, specifically, confirms disproportionately low health outcomes and high environmental burdens for Zip Code 98118 compared to select other Seattle neighborhoods. However, from a King County perspective, there are other neighborhoods and zip codes that exhibit disproportionately low health outcomes and high environmental burdens similar to those in Zip Code 98118.



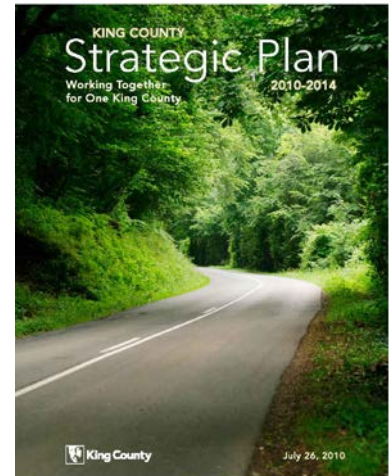
A Health Impact Assessment (HIA) on the EPA proposed cleanup plan for the waterway (Daniell et. al. 2013) presents a detailed analysis of several unintended positive and negative health impacts that may plausibly result from clean up actions, and includes a look at disproportionate health impacts, but does so only in considering the cleanup plan and in combination with other existing community stressors, *rather than considering how component elements (e.g., cleanup technologies) of a cleanup differ in their impacts on determinants*. Similarly, the EPA Environmental Justice Analysis of the Lower Duwamish Cleanup considers cleanup **a single action**, instead of component technologies that can be used in different combinations. Therefore, in these two studies, it is difficult to determine the different effects of the plan alternatives on existing disproportionate conditions in the effected community.

What this King County equity and social justice review [this EIR] adds - that is not included in above related work - is a comparative look at clean up actions themselves (the building blocks of a cleanup plan), and a how their deployment at varying levels will bear on selected determinants of equity. This approach can more clearly demonstrate what effect the project can have on determinants of equity and how particular decisions on aspects of the project can change those impacts. This provides the information for decision makers to select project components that limit negative impacts on existing deficit-level determinants and promote the remediation of existing disproportionalities.

Policy framework and drivers

Through adoption of the *King County Strategic Plan 2010-2014: Working Together for One King County*, King County has elevated its work on equity and social justice from an initiative to an integrated effort that applies the countywide strategic plan's principle of "fair and just" intentionally in all the county does in order to achieve equitable opportunities for all people and communities.

The *Equity and Social Justice Ordinance* establishes definitions and identifies specific approaches necessary to implement and achieve the "fair and just" principle. The ordinance calls for King County to "consider equity and social justice impacts in all decision-making so that decisions increase fairness and opportunity for all people, particularly for people of color, low-income communities and people with limited English proficiency or, when decisions that have a negative impact on fairness and opportunity are unavoidable, steps are implemented that mitigate the negative impact."



The Equity Impact Review (EIR) tool (Appendix A) is both a process and a tool to identify, evaluate, and communicate the potential equity impacts - both positive and negative - of a policy, program, or project on equity.

Relevant definitions from the Equity and Social Justice Ordinance include:

- **"Equity"** means all people have full and equal access to opportunities that enable them to attain their full potential.
- **"Community"** means a group of people who share some or all of the following: geographic boundaries, sense of membership, culture, language, common norms and interests.
- **"Determinants of equity"** means the social, economic, geographic, political and physical environment conditions in which people in our county are born, grow, live, work and age that lead to the creation of a fair and just society. Access to the determinants of equity is necessary to have equity for all people regardless of race, class, gender or language spoken. Inequities are created when barriers exist that prevent individuals and communities from accessing these conditions and reaching their full potential.

This tool, which consists of 3 Stages, offers a systematic way of gathering information to inform decision-making about actions which impact equity, including policies, programs, and projects in King County.

The first stage is to determine how the proposal can impact any determinants of equity, either positively or negatively. This stage initially predicts which determinants of equity might be impacted by the action and likely impact on those determinants.

The second stage is to define the affected area and population, so the effect of the impacts can be assessed at the proper scale. This stage includes determining the populations that are potentially affected by the proposal and how those communities will benefit or be further

burdened by the proposal. Various sources of information need to be gathered to understand the characteristics and locations of populations groups that might be impacted.

In the third stage of analysis includes considering the potential for pro-equity approaches that best advance positive equity impacts and ensure negative impacts are avoided or mitigated to the degree practical.

The 2012 annual report of King County Equity and Social Justice¹ shows that King County is increasingly diverse, with a non-white population that has grown from 13 percent in 1980 to 35 percent in the 2010 census. That trend is expected to continue, as nearly half of all county residents under 18 are non-white. More than 100 languages are spoken in King County, and 11 percent of those over age 5 have limited-English proficiency.

The 3 Stages of the Equity Impact Review Tool are:

- **Stage I** - What is the impact of the proposal on determinants of equity?
- **Stage II** - Assessment: Who is affected?
- **Stage III** - Impact review: Opportunities for action

The report highlights the 14 determinants of equity – the conditions in which county residents are born, grow, live, work, and age – and characterizes them as baseline markers to assess progress and areas for improvement in creating a fair and just society. The report includes maps and other statistics that reveal inequities across King County by place, race, and income, and the factors that contribute to opportunity and quality of life; for example:

- Life expectancy varies from a high of 86 years in one neighborhood to a low of 77 years in another – a difference of 9 years.
- South King County and south Seattle have the greatest concentration of households below the median household income. In 2010, African American and Native American households earned just over half of the median income of white households.
- Since 2008, the largest decline in home values has occurred in South King County communities, low-income areas and more racially diverse communities.
- The incarceration rate for African Americans in King County is roughly 8 times the rate of incarceration for whites.
- Food hardship has increased by half since 2007 in King County and varies significantly by race. Nearly two in five Latino adults and more than one in five African American adults report food hardship.

Approach

Maps depicting how determinants are distributed as compared primarily to City of Seattle neighborhood conditions are presented in Appendix B. This mapping exercise using data from the King County GIS data warehouse confirms concerns about the Duwamish Valley and the South Park and Georgetown neighborhood's deficits in parks, tree canopy, access to healthy food, and higher asthma hospitalization rates, especially for children and youth, among other

¹ <http://www.kingcounty.gov/exec/equity/~media/exec/equity/documents/EquityReport2012.ashx>

concerns.² The spatial portrayals are measurable factors that can help identify disproportionalities in determinants of equity and social justice. While there are many ways to qualitatively assess whether certain areas suffer inequities in service, environmental conditions, health or other social factors, there are only a few metrics that exist at the city or county scale where there can be some semi-quantitative assessment to determine the degree of known disproportionality.

Because several organizations, including Duwamish River Cleanup Coalition (DRCC), Puget Sound Sage, University of Washington (UW), and Antioch, have recently engaged and surveyed South Park and Georgetown residents to identify their community improvement priorities (via Community Action for a Renewed Environment [CARE] – Healthy Communities Project³ and the Health Impact Assessment and CHIA projects cited earlier), DNRP did not re-engage community members to ask very similar questions. Determinants of concern to residents for this analysis were therefore derived from reports from DRCC and UW that identified community priorities including air quality, recreation opportunities, and healthy food access which were cross-referenced with mapping done by King County in its effort to understand how determinants of equity vary across the landscape of our communities⁴.

The Feasibility Study defines and details variations in the short- and long-term effects of dredging or other remedial technologies used in the alternatives. The alternatives contain different combinations of the sediment remedial technologies (e.g., removal through dredging, containment through capping, and natural recovery). By selecting two alternatives with substantial differences in the choice of technologies, the assessment of equity and social justice effects this choice represents can be simplified. So instead of assessing all 12 alternatives, the primary effects of the decision can be demonstrated by comparing just two.

Alternative 5C and 5R from the Feasibility Study were selected to show the differences a cleanup alternative will have on the determinants. Both Alternative 5C and 5R actively remediate (through dredging, capping, or enhance natural recovery) 157 acres of sediment (see Figure 2). However, Alternative 5R focuses on removal (dredging) as the primary remedial technology whereas Alternative 5C focuses on a combination of remedial technologies for the same acres of sediment cleaned. All the alternatives have some variation of these two combinations.

The short- and long-term effects⁵ of the cleanup technologies and approaches were identified and documented in the Feasibility Study (AECOM 2012), which served as the primary resource for analyzing how short- and long-term effects of the project could bear on King County's 14 determinants of equity and social justice. A multi-step version of equity impact review process (see Figure 1) was applied, which included:

1. A screening step to size up how the actions generally relate to the 14 determinants

² Census tracts (or block groups when data allowed) are used to characterize the LDW Community Area covers a 3 square mile area (South Park and Georgetown) and includes the following census tracts and associated block groups: 010900 and 011200. The area is also identified for economic data by forecast analysis zones (FAZ), developed by the PSRC. The FAZs used to characterize the broader LDW Economic Area (Duwamish Industrial Area) are: 3825, 3905, 5716, 5815, 5825, 5826. The FAZ boundaries cover a 24.6 square mile area.

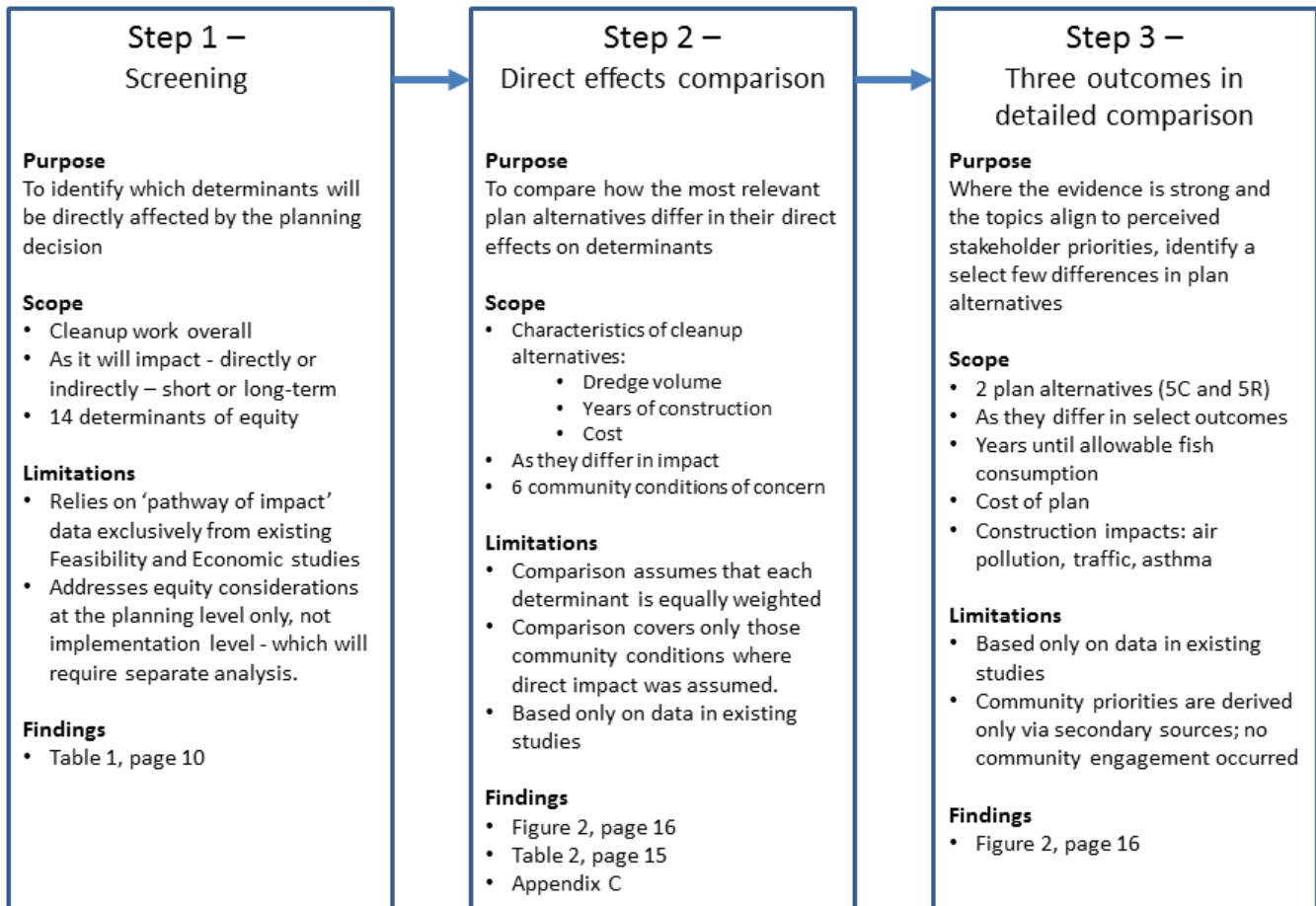
³ <http://duwamishcleanup.org/programs/duwamish-community-health-initiative/duwamish-valley-healthy-communities-project/>

⁴ <http://www.kingcounty.gov/exec/equity.aspx>

⁵ Short-term effects are during construction (7 or 17 years) , long-term effects are after completion (up to 45 years)

2. A comparative look at 6 determinants which were found to be directly affected by cleanup approaches, and
3. A final comparison of the most significant differences between a selected few outcome areas – fish access, cost, and air pollutants.

Figure 1. Three Steps of Analysis and Findings – LDW Cleanup Plan Equity Impact Review



The screening step (Table 1) determined that the cleanup actions have potential pathways of effect on six of the 14 determinants defined by the King County Equity and Social Justice Ordinance:

- Community Economic Development
- Community and Public Safety
- Food Systems
- Healthy Built and Natural Environment
- Job training and Jobs
- Neighborhoods

Table 1. LDW Cleanup Potential to Affect King County Environmental and Social Justice Determinants

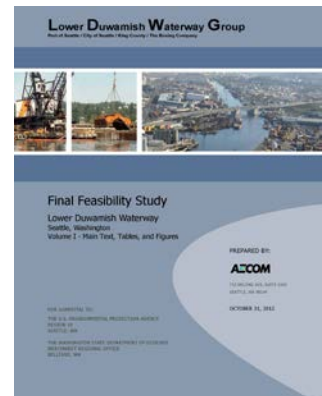
Determinant	Potential to Affect Determinant
<p>Community economic development that supports local ownership of assets, including homes and businesses, and assures fair access for all to business development and business retention opportunities</p>	<p>Effect of cleanup on economic development. A) Local effects from diversion of capital from business and governments to the cleanup from other uses. B) Broader effects of economic contraction and disruptions from cleanup on regional economy short and long term. Effect of cleanup on community development: potential of post cleanup gentrification.</p>
<p>Community and public safety that includes services such as fire, police, emergency medical services and code enforcement that are responsive to all residents so that everyone feels safe to live, work and play in any neighborhood of King County</p>	<p>Effect of cleanup on risks to local populations that 1) consume resident seafood both during and after implementation and 2) live in area impacted by construction activities. Cleanup effect on direct contact and seafood consumption risks. Widespread effects would be from the distribution and use of available County resources.</p>
<p>A law and justice system that provides equitable access and fair treatment for all</p>	<p>No direct effects from cleanup and any indirect effects unable to predict.</p>
<p>Early childhood development that supports nurturing relationships, high-quality affordable child care and early learning opportunities that promote optimal early childhood development and school readiness for all children</p>	<p>No direct effects from cleanup and any indirect effects could affect childhood development but difficult to predict and covered under community and public safety.</p>
<p>Education that is high quality and culturally appropriate and allows each student to reach his or her full learning and career potential</p>	<p>No direct effects from cleanup and any indirect effects unable to predict.</p>
<p>Equity in county practices that eliminates all forms of discrimination in county activities in order to provide fair treatment for all employees, contractors, clients, community partners, residents and others who interact with King County</p>	<p>No direct effects from cleanup and any indirect effects unable to predict.</p>
<p>Food systems that support local food production and provide access to affordable, healthy, and culturally appropriate foods for all people</p>	<p>Effect on locally available food source both during and after cleanup. During: access limitations and elevated risk. After: reduction in risk but still limited in availability.</p>
<p>Health and human services that are high quality, affordable and culturally appropriate and support the optimal well-being of all people</p>	<p>No direct effects from cleanup on access to services and any indirect effects unable to predict.</p>
<p>Healthy built and natural environments for all people that include mixes of land use that support: jobs, housing, amenities and services; trees and forest canopy; and clean air, water, soil and sediment</p>	<p>Effect of cleanup on natural and built both during and after implementation. During: construction effects on environment (air, water, habitat, benthic community) and on built (disruption in staging areas and limited access to river). Post construction improvements (water, habitat, benthic community) and built (access to river and new greenspaces)</p>
<p>Housing for all people that is safe, affordable, high quality and healthy</p>	<p>No direct effects from cleanup and any indirect effects unable to predict (potential of gentrification incorporated under economic development).</p>

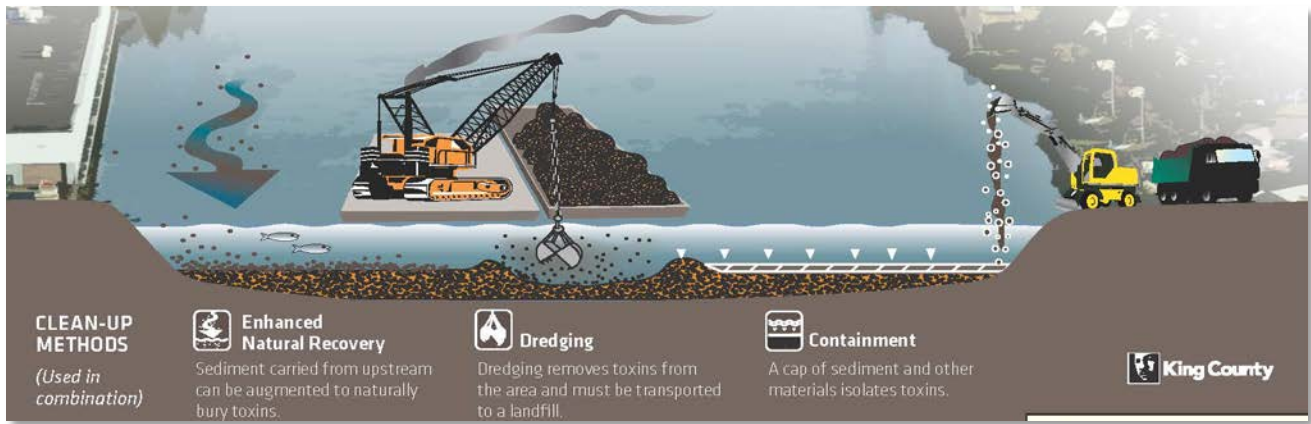
Determinant	Potential to Affect Determinant
Job training and jobs that provide all residents with the knowledge and skills to compete in a diverse workforce and with the ability to make sufficient income for the purchase of basic necessities to support them and their families	Small number of temporary local jobs created by cleanup. Indirect and broad effects on jobs are covered under economic effects.
Neighborhoods that support all communities and individuals through strong social networks, trust among neighbors and the ability to work together to achieve common goals that improve the quality of life for everyone in the neighborhood	No direct effects from cleanup and indirect effects can occur from response to the cleanup.
Parks and natural resources that provide access for all people to safe, clean and quality outdoor spaces, facilities and activities that appeal to the interests of all communities	No direct effects from cleanup on access to parks and any indirect effects unable to predict. Access to natural resources is also incorporated under natural environment and food systems.
Transportation that provides everyone with safe, efficient, affordable, convenient and reliable mobility options including public transit, walking, carpooling and biking	No direct effects from cleanup on access to safe and efficient transportation and any indirect effects are from increased traffic in area.

All six determinants appear to have some disproportionality when compared to other areas of the City of Seattle. This is not to say they are the only areas of the city that have a deficit in measures of that determinant, but appear to have deficits in comparison to the average access level in the city. Other neighborhoods in Seattle clearly also have deficits in these same determinants. Note that some determinants (such as neighborhoods) do not appear to have clear quantitative measures to determine disproportionality. In these cases qualitative or more indirect measures were used.

Not included in the second step of this assessment were sediment cleanup actions that had the potential for indirect effects on a determinant, as in these cases, there is a weaker pathway of impact which is insufficient for predicting or quantifying the likely affects without relying on opinion or conjecture. The remaining eight determinants were found to have either no pathway of impact or there was only an indirect pathway that was not clearly demonstrated or could not be quantified in any meaningful semi-quantitative way.

In this second step, the short- and long-term effects of proposed project actions (as defined in the Feasibility Study) were categorized by determinant and by impact. In some cases where a direct measure was not available, a surrogate for an impact was used. The effects of the proposed project actions were assessed both to the area immediate adjacent to the project (the Lower Duwamish Valley including the Georgetown and South Park communities) and the broader community, represented by Seattle (assumed for this case to be more directly comparable than broader King County with its suburban and rural areas for determination of disproportionate risks).





The two alternatives selected for comparison (5C and 5R) are within the range of remedial actions considered by EPA for the preferred cleanup plan. Alternative 5R focuses on removal (dredging) as the primary remedial technology whereas Alternative 5C focuses on a combination of remedial technologies for the same acres of sediment cleaned. EPA recently released a proposed cleanup plan for the Lower Duwamish Waterway Superfund site (EPA 2013b); this plan outlines EPA's preferred cleanup alternative for the Lower Duwamish Waterway. These two alternatives bookend EPA's proposed plan and can also indicate the equity outcome implications for EPA revising its proposal.

The range of each action across alternatives was then used to define the scope of effect. Both alternatives were ranked depending on where in that range the measurement fell. Negative impacts were ranked between -1 and -5 (with -5 being the most significant negative impact) and positive impacts were ranked between 1 and 5 (with 5 being the most significant positive impact). The rankings were then averaged under each determinant, though no attempt was made to weigh or value the determinants relative to one another. Table 2 presents a comparison of the average score by determinant for each alternative were used to compare the alternatives and their relative effect on determinants. The details of the analysis are presented in Appendix C.

Findings

Table 2 summarizes the semi-quantitative assessment in project effects on King County's equity and social justice determinants for short and long-term impacts both locally (in valley) and more regionally (outside of valley). Similar results between the two alternatives are represented by yellow shading. Red shading represents a negative or increased negative impact compared to the other alternative for that determinant. Green shading represents a positive or less-negative impact compared to the other alternative for that determinant. Determinants shaded blue have been identified through the public engagement activities discussed earlier as those with more primary importance to the public (air quality, access to healthy environments, access to health food).

Note that the results presented in Table 2 for the determinant Neighborhoods/social networks are indirect measures and are therefore not included further in the analysis. As stated in the approach, there is a weaker pathway of impact for indirect measures which is considered insufficient for adequately predicting or quantifying the likely affects.

Figure 2 summarizes the differences between the two alternatives based on the outcomes of the comparative impact shown in Table 2. Based on this analysis, alternative 5R has greater short- and long-term negative impacts on equity and social justice determinants than alternative 5C. Positive impacts (shown as positive scores on Table 2) are similar for both alternatives and are only seen in the long-term for the area near the Lower Duwamish. In general, there are greater differences in short-term than long-term impacts and near Lower Duwamish (local) than outside Lower Duwamish (regional) impacts.

Implications

The differences in impact to determinants between the two alternatives considered (5C and 5R) demonstrate that more dredging/longer construction periods will have more negative impacts on the most salient ESJ determinants. An alternative that uses a combination of remedial technologies (versus a dredging-focused alternative), with shorter construction period, will perform best to minimize increases and in some cases remedy existing disproportionalities in access to determinants in the affected communities.

Figure 3 graphically presents the differences between alternatives that rely more on dredging (5R) or that rely less on dredging and more on combined technologies. Construction related impacts are greater for dredging focused alternative and affect the community longer. Dredging releases contaminants back into the water column, where they are accumulated by the resident seafood. Until dredging ceases, the risk from eating seafood remains high. Removing more material means additional years of elevated human health risks from resident seafood consumption. Since long-term human health risks for seafood consumption are predicted to be the same for each alternative, the overall risk to community is higher with more dredging. In addition, with longer construction periods, there is a longer period of impacts to air quality and thus health in the communities closest to the waterway.

An alternative that uses a combination of remedial technologies (versus a dredging-focused alternative), with shorter construction period, will perform best to minimize increases and in some cases remedy existing disproportionalities in access to determinants in the affected communities.

While the project itself cannot mitigate many existing disproportionalities, it can improve several. There is no alternative that eliminates risks from resident seafood consumption. The achievable risk levels after cleanup is complete are effectively the same for each alternative. But there are differences among alternatives in the length of time that seafood consumers remain at current unacceptable risk levels (which is tied to construction time) with longer periods of elevated risk. Therefore, the risks to seafood consumers are different between alternatives, with greater exposure to the higher risks for seafood consumers from alternatives associated with longer construction times. This can be of particular concern for those with short exposure periods of concern like children and pregnant women.

There are also differences among alternatives (tied proportionally to construction times) in how they can improve some existing disproportionalities. Reduction of the dredging and greater use of combined technologies (leading to shorter construction period) offers the most improvements to project effects on five of the six existing disproportionalities. Using dredging as primary remedial technology, which lengthens construction periods, offers some small improvements

from secondary economic gains. However, this offers no other long-term improvements to risk from seafood consumption or direct contact with sediments.

Therefore, selecting an alternative with less dredging and greater use of combined remedial technologies will reduce existing disproportionalities in determinants of community and public safety, food systems, and healthy built and natural environment to a greater extent than selecting an alternative with more dredging. Selecting an alternative with more dredging could improve the family wage jobs and job training determinant to a greater extent than selecting an alternative with less dredging; however, economic contraction from costs incurred by businesses for the cleanup would likely negate that short-term benefit with reductions in the labor force (ECONorthwest 2010a, b).

Table 2. Impact of Lower Duwamish Cleanup Alternatives on Equity and Social Justice Determinants

Determinant	Area near Lower Duwamish				Area outside Lower Duwamish			
	5C		5R		5C		5R	
	Short-term (construction)	Long-term (45 years)	Short-term (construction)	Long-term (45 years)	Short-term (construction)	Long-term (45 years)	Short-term (construction)	Long-term (45 years)
1.Community economic development*	-1.5	-0.9	-3.0	0.0	-0.4	0.0	-0.3	0.0
2.Community and public safety*	-2.0	3.5	-4.7	3.5	0.0	0.0	0.0	0.0
3.Law and justice system	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
4.Early childhood development	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
5.Education	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
6.Equity in county practices	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
7.Food systems*	-2.1	2.7	-5.0	2.7	0.0	0.0	0.0	0.0
8.Health and human services	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
9.Healthy built and natural environments*	-1.0	2.5	-3.0	1.7	-0.5	0.0	-1.0	0.0
10.Housing	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
11.Job training and jobs*	-1.5	-0.9	-3.0	0.0	-0.4	0.0	-0.3	0.0
12.Neighborhoods/social networks*	0.0	3.5	0.0	3.5	0.0	0.0	0.0	0.0
13.Parks and natural resources	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
14.Transportation	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Blue - Metric of primary importance to public

* - determinant used for summary graphic

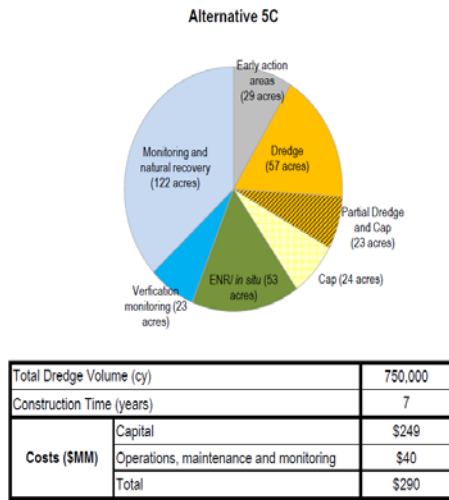
Yellow - alternatives are equivalent to each other (within 0.5 points of each other)

Red - alternative scores worse than other alternative (>0.5 points difference)

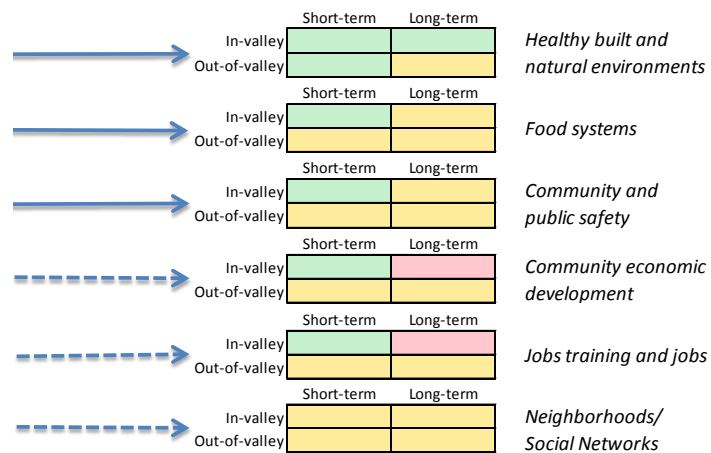
Green - alternative scores better than other alternative (>0.5 points difference)

Figure 2. Impact of Lower Duwamish Cleanup Alternatives on Equity and Social Justice

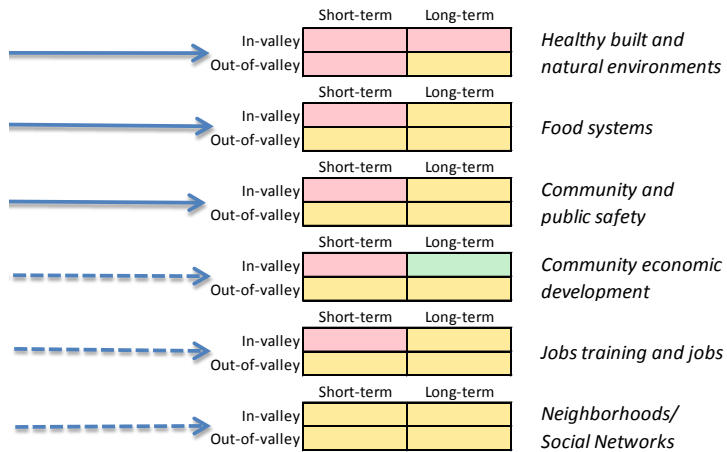
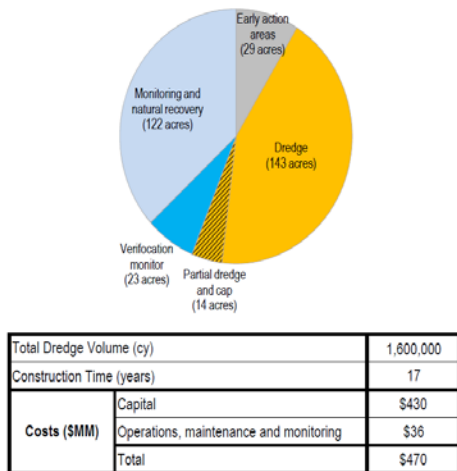
Characteristics of clean-up alternatives



Comparative impact of alternatives on community conditions of concern



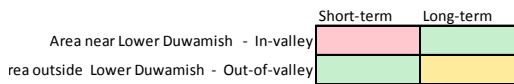
Alternative 5R



Key

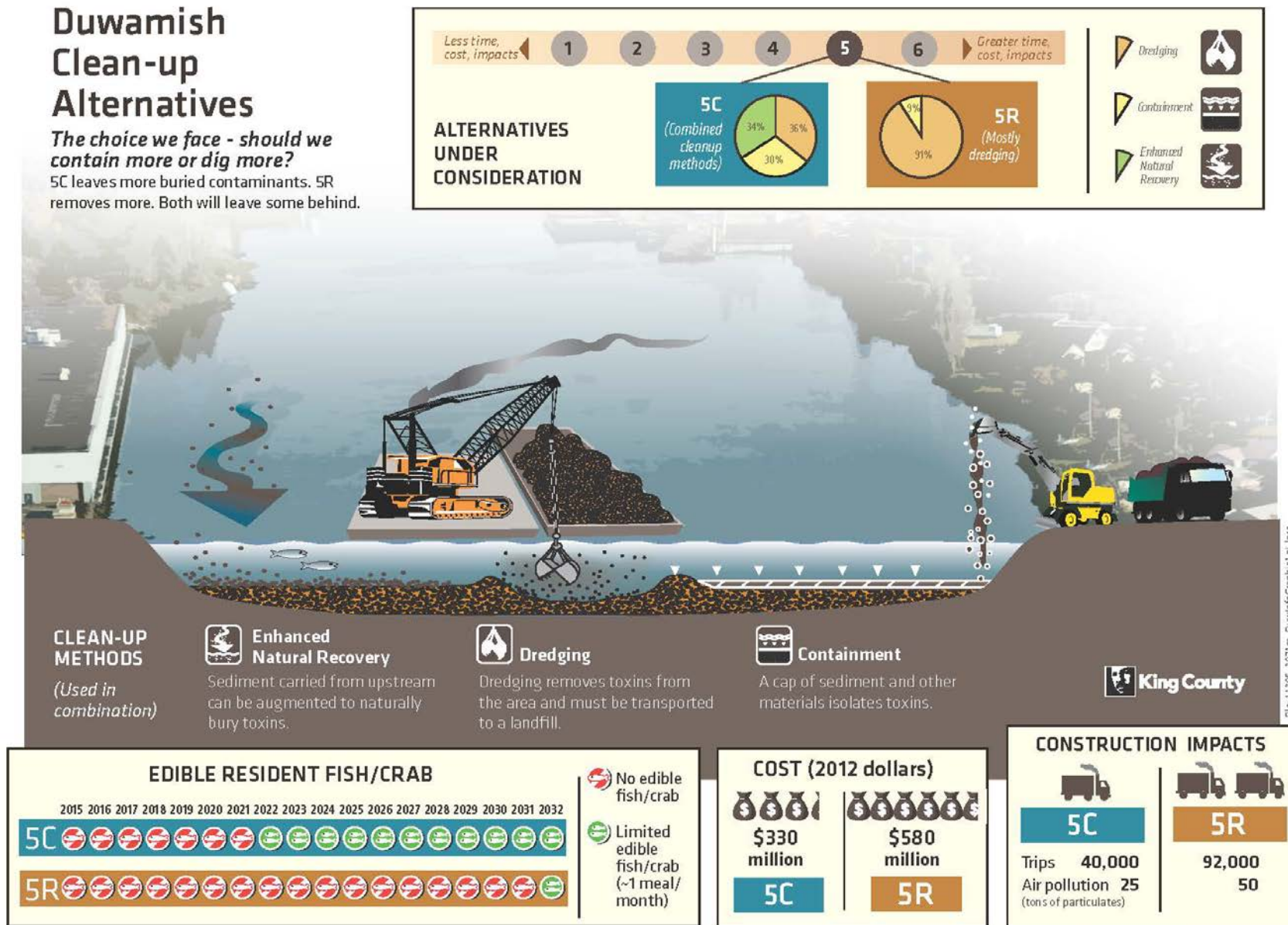
Solid arrow = significant outcome of clean-up
 Dashed arrow = less significant outcome of clean-up

Comparison of outcomes



Yellow - alternatives are equivalent to each other
Red - alternative scores worse than other alternative
Green - alternative scores better than other alternative

Figure 3. Duwamish-Cleanup Alternatives Comparison



References

AECOM 2012. Final Feasibility Study for the Lower Duwamish Waterway. Prepared for the Lower Duwamish Waterway Group for submittal to the U.S. Environmental Protection Agency and Washington State Department of Ecology.

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Daniell, W., L. Gould, B.J. Cummings, J Childers and A. Lenhart. Health Impact Assessment: Proposed Cleanup Plan for the Lower Duwamish Waterway Superfund Site. Prepared by University of Washington, School of Public Health, Just Health Action, and Duwamish River Cleanup Coalition/Technical Advisory Group. Seattle WA.

ECONorthwest 2010a. Estimates of Economic Impacts of Clean-up Activities Associated with the Lower Duwamish Superfund. Prepared for King County Department of Natural Resources and Parks, Wastewater Treatment Division, Seattle WA.

ECONorthwest 2010b. Lower Duwamish Economic Analysis. Prepared for King County Department of Natural Resources and Parks, Wastewater Treatment Division, Seattle WA.

EPA. 2013a. Draft Environmental Justice Analysis for the Lower Duwamish Waterway Cleanup. US EPA, Region 10, Seattle, WA.

EPA. 2013b. Proposed Plan Lower Duwamish Waterway Superfund Site. US EPA, Region 10, Seattle, WA.

Gould L. and B.J. Cummings. 2013. Duwamish Valley Cumulative Health Impacts Analysis. Just Health Action and Duwamish River Cleanup Coalition/Technical Advisory Group. Seattle, WA.

Appendices

Appendix A. King County Equity Impact Review Tool

Appendix B. Map Atlas of Selected Determinants

Appendix C. Determinant Table of Project Impacts on All 14 Determinants

Appendix A. King County Equity Impact Review Tool

KING COUNTY EQUITY IMPACT REVIEW TOOL

REVISED OCTOBER 2010

Contacts for questions about use of this tool:

Gloria Albetta gloria.albetta@kingCounty.gov
Sandy Ciske sandra.ciske@kingcounty.gov



King County

Introduction

Through adoption of the *King County Strategic Plan 2010-2014: Working Together for One King County*, King County has transformed its work on equity and social justice from an initiative to an integrated effort that applies the countywide strategic plan's principle of "fair and just" intentionally in all the county does in order to achieve equitable opportunities for all people and communities.

The *Equity and Social Justice Ordinance* establishes definitions and identifies specific approaches necessary to implement and achieve the "fair and just" principle. The ordinance calls for King County to "consider equity and social justice impacts in all decision-making so that decisions increase fairness and opportunity for all people, particularly for people of color, low-income communities and people with limited English proficiency or, when decisions that have a negative impact on fairness and opportunity are unavoidable, steps are implemented that mitigate the negative impact."

The Equity Impact Review (EIR) tool is both a process and a tool to identify, evaluate, and communicate the potential impact - both positive and negative - of a policy or program on equity. Relevant definitions from the Equity and Social Justice Ordinance include:

"Equity" means all people have full and equal access to opportunities that enable them to attain their full potential.

"Community" means a group of people who share some or all of the following: geographic boundaries, sense of membership, culture, language, common norms and interests.

"Determinants of equity" means the social, economic, geographic, political and physical environment conditions in which people in our county are born, grow, live, work and age that lead to the creation of a fair and just society. Access to the determinants of equity is necessary to have equity for all people regardless of race, class, gender or language spoken. Inequities are created when barriers exist that prevent individuals and communities from accessing these conditions and reaching their full potential.

This tool, which consists of 3 Stages, will offer a systematic way of gathering information to inform planning and decision-making about public policies and programs which impact equity in King County. The 3 Stages are as follows:

- Stage I What is the impact of the proposal on determinants of equity?**
The aim of the first stage is to determine whether the proposal will have an impact on equity or not.
- Stage II Assessment: Who is affected?**
This stage identifies who is likely to be affected by the proposal.
- Stage III Impact review: Opportunities for action**
The third stage involves identifying the impacts of the proposal from an equity perspective. The goal is to develop a list of likely impacts and actions to ensure that negative impacts are mitigated and positive impacts are enhanced.

Stage I: What is the impact on determinants of equity?

The aim of this stage is to screen whether the policy or program will have an impact on equity. If the proposal does not focus on a determinant of equity do not proceed to the other stages.

Policy or program title:

Department and/or division:

A. Describe the proposal (include objectives and general geographic area of focus)

B. What are the intended outcomes of this policy or program?

Stage I: What is the impact on determinants of equity? (continued)

Stage One lists determinants of equity that may be affected by the proposed program/policy that you are considering.

Review this list and circle the determinants of equity that apply to your policy or program. *If your answer is none, then you are done.*

Equity in county practices that eliminates all forms of discrimination in county activities in order to provide fair treatment for all employees, contractors, clients, community partners, residents and others who interact with King County;

Job training and jobs that provide all residents with the knowledge and skills to compete in a diverse workforce and with the ability to make sufficient income for the purchase of basic necessities to support them and their families;

Community economic development that supports local ownership of assets, including homes and businesses, and assures fair access for all to business development and retention opportunities;

Housing for all people that is safe, affordable, high quality and healthy;

Education that is high quality and culturally appropriate and allows each student to reach his or her full learning and career potential;

Early childhood development that supports nurturing relationships, high-quality affordable child care and early learning opportunities that promote optimal early childhood development and school readiness for all children;

Healthy built and natural environments for all people that include mixes of land use that support: jobs, housing, amenities and services; trees and forest canopy; clean air, water, soil and sediment

Community and public safety that includes services such as fire, police, emergency medical services and code enforcement that are responsive to all residents so that everyone feels safe to live, work and play in any neighborhood of King County;

A law and justice system that provides equitable access and fair treatment for all;

Neighborhoods that support all communities and individuals through strong social networks, trust among neighbors and the ability to work together to achieve common goals that improve the quality of life for everyone in the neighborhood;

Transportation that provides everyone with safe, efficient, affordable, convenient and reliable mobility options including public transit, walking, car pooling and biking.

Food systems that support local food production and provide access to affordable, healthy, and culturally appropriate foods for all people;

Parks and natural resources that provide access for all people to safe, clean and quality outdoor spaces, facilities and activities that appeal to the interests of all communities; and

Health and human services that are high quality, affordable and culturally appropriate and support the optimal well-being of all people;

Proceed to Stage II

STAGE II: Who is affected?

This stage identifies who is likely to be affected by the proposal. Use data to identify the population groups that will experience a differential impact. Are the impacts disproportionately greater for communities of color, low-income communities, or limited English proficiency (LEP) communities? At the end of this stage you will be able to identify which communities will benefit and which communities are burdened.

RESOURCES

The following resources can help you determine who may be impacted throughout the county.

- King County 2000 Census data <<http://www5.kingcounty.gov/KCCensus>>
- GIS maps in public folders <Public folders → Executive → Equity → Resources → ESJI Maps>
- Department or division specific data
- Data on clients or consumers of services
- Data on community partners or contractors who provide services (they may also be a source of data)
- Relevant research or literature

Stage II – A. Equity Assessment (provide a map and a detailed description using tables, charts or graphs for each item):

Is your proposal (please check one of the following):

- | | |
|---|-------------------------------|
| <input type="checkbox"/> A county-wide proposal | If yes: Go to S.II.A.1 |
| <input type="checkbox"/> A proposal focused on a specific geographic area | If yes: Go to S.II.A.2 |
| <input type="checkbox"/> A capital project | If yes: Go to S.II.A.3 |
| <input type="checkbox"/> A proposal focused on a special population | If yes: Go to S.II.A.4 |
| <input type="checkbox"/> An internal county proposal | If yes: Go to S.II.A.5 |

S.II.A.1. IF COUNTY-WIDE PROPOSALS: identify population characteristics and maps relevant to the population most directly affected (attach maps or other data as necessary).

[When S.II.A.1 is complete, proceed to S.II.B.1]

S.II.A.2. IF SPECIFIC GEOGRAPHIC REGION(S): identify the demographics of the area, particularly by race/ethnicity, income level and limited English proficiency (attach maps or other data as necessary).

[When S.II.A.1 is complete, proceed to S.II.B.2]

S.II.A.3. IF CAPITAL PROJECT: identify both population characteristics and maps relevant to the entire County as well as geographic areas or specific populations that are specifically targeted in this proposal (attach maps or other data as necessary).

[When S.II.A.3 is complete, proceed to S.II.B.3]

S.II.A.4. IF SPECIAL POPULATION(S) (not defined geographically): identify the demographics of the population, particularly by race/ethnicity, income level and limited English proficiency (attach maps or other data as necessary).

[When S.II.A.4 is complete, proceed to S.II.B.1]

S.II.A.5. IF INTERNAL COUNTY PROPOSAL: identify the demographics of the department, division, or area of focus for the proposal, particularly by race/ethnicity and income level as the data is available.

[When S.II.A.4 is complete, proceed to S.II.B.1]

Stage II – B. Analysis

Using the assessment information above, review and interpret your findings to determine which population group(s) will benefit and which will not.

S.II.B.1. Please list race/ethnicity and low income groups positively or negatively affected by the proposal. (These are the groups identified above in responses to SII.A.1, 2, 3, or 4)

S.II.B.2. *If the proposal is not county-wide*, provide information for why you selected this geographic area instead of other areas of the County where the impact on low-income communities, communities of color, and LEP communities may be equal or greater.

S.II.B.3. *For capital projects*, will this project have a negative or positive impact on the surrounding community or increase the current burdens to that community? (YES or No)
If yes, please describe.

Proceed to Stage III

Stage III: Impact Review: Opportunities for Action

A. Actions to mitigate/enhance negative/positive impact

Stage III.A involves identifying the impacts of the proposal from an equity perspective. The goal is to develop a list of likely impacts and actions to ensure that negative impacts are mitigated and positive impacts are enhanced.

Complete Column 1 of the Stage III.A worksheet using the responses listed in Stage II.B.1. Columns 2 and 3 are a detailed discussion of the positive and negative impacts of the proposal on the identified population groups by race/ethnicity, income and limited English speakers. In Column 4, describe any recommendations or actions which arise from your discussions about impact. These might include:

- Ways in which the program/policy could be modified to enhance positive impacts, to reduce negative impacts for identified population groups;
- Ways in which benefits of modifying program/policy to remove differential impacts outweigh the costs or disadvantages of doing so;
- Ways in which existing partnerships could be strengthened to benefit the most affected.

STAGE III.A. WORKSHEET

(1) Population(s) Affected Disproportionately <small>(populations from S.II.B.1 list)</small>	(2) Describe Potential Positive Impact (Beneficial)	(3) Describe Potential Negative Impact (Adverse)	(4) Actions to enhance positive or mitigate negative/other comments <small>(these responses also complete the first column of S.III.B worksheet)</small>

Proceed to Stage III.B

Stage III.B: Prioritization of Actions

The goal of this stage is to prioritize the actions that are needed to enhance or mitigate the impacts.

It may prove impossible to consider all potential impacts and identified actions. In this stage, participants are encouraged to prioritize or rank the actions based on the likelihood to impact equity. For each of the actions the following should be considered:

- the costs of the action
- is the impact on equity high or low
- what needs to happen to increase the feasibility of the action
- what other resources are needed
- who will implement the action
- the timing of the actions

Proceed to Stage III.C

Stage III.C: Recommendation(s) and Rationale

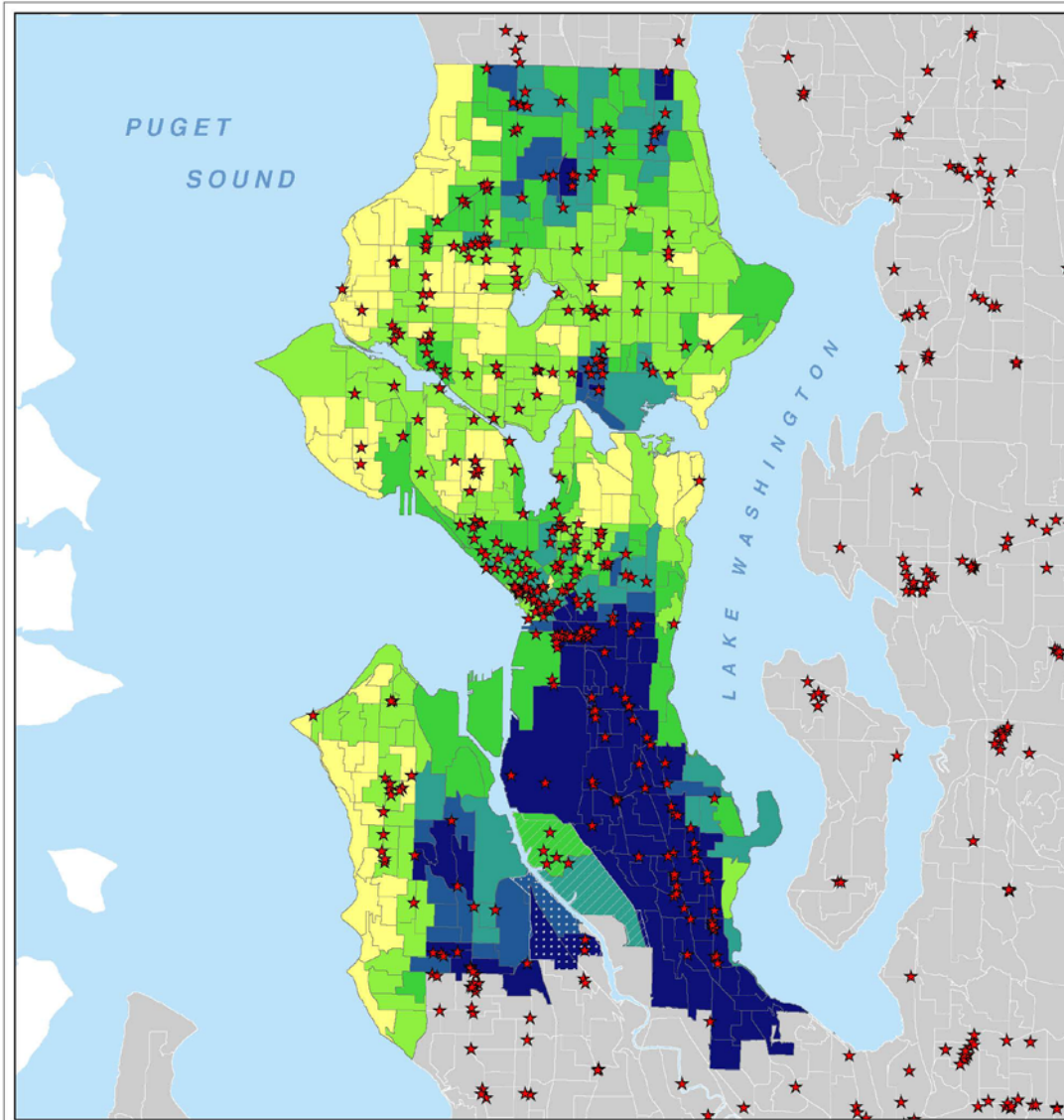
The goal of Stage III.C is to propose set of recommendations for modifying the proposal. When modifications are not possible, the option of not proceeding with the proposal needs to be addressed.

Occasionally, it is possible to find a single, clear solution which will provide the optimum impact. However, in most cases a series of options will be defined and presented. Recommendations should be prioritized as appropriate.

S.III.C.1. Based on your review of actions in Stage III.B, please list your recommendations for the policy/program and why you chose them. Please describe the next steps for implementation.

S.III.C.2. Who participated in the equity impact review process?

Appendix B. Map Atlas of Selected Determinants



Seattle Minority Population Access to Grocery Stores - 2010 US Census

City of Seattle

Category	Non-White Minority % Range	Total Population	Total Non-White Minority Population	% Non-White Population	Average Distance in Miles to Nearest Grocery Store
A	Below 15.00%	103,936	13,287	12.78%	0.41
B	15.00% - 24.99%	198,866	38,796	19.51%	0.31
C	25.00% - 34.99%	99,172	29,829	30.08%	0.27
D	35.00% - 44.99%	59,732	23,909	40.03%	0.25
E	45.00% - 54.99%	36,923	18,434	49.93%	0.26
F	55.00% & Greater	110,399	81,017	73.39%	0.25

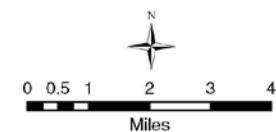
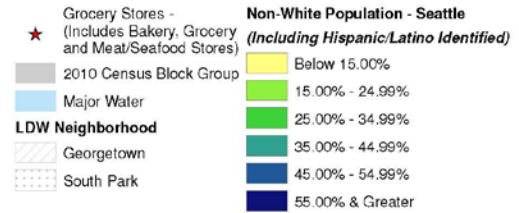
Georgetown

Category	Non-White Minority % Range	Total Population	Total Non-White Minority Population	% Non-White Population	Average Distance in Miles to Nearest Grocery Store
C	25.00% - 34.99%	558	156	27.96%	0.16
D	35.00% - 44.99%	729	289	39.65%	0.69

South Park

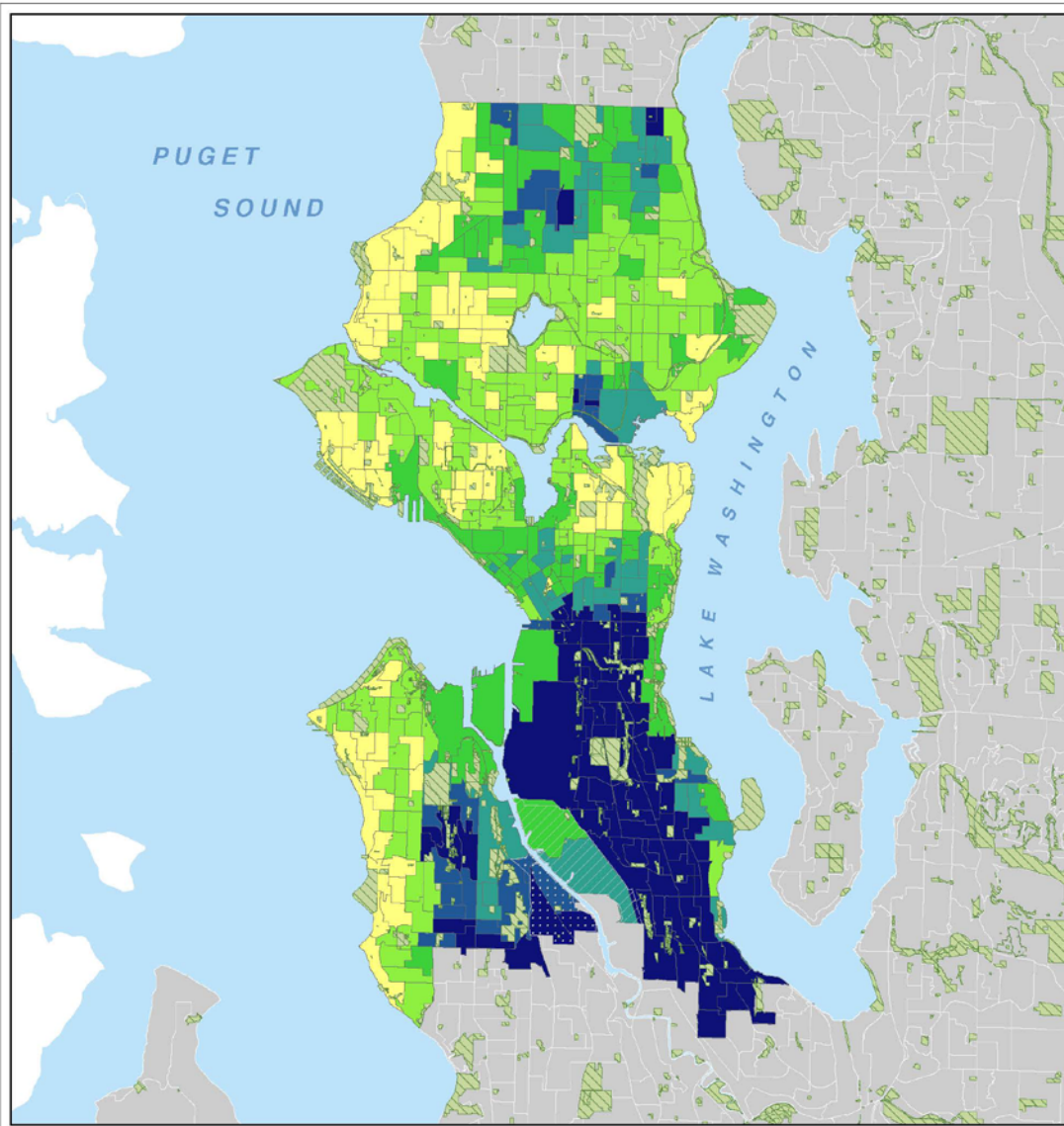
Category	Non-White Minority % Range	Total Population	Total Non-White Minority Population	% Non-White Population	Average Distance in Miles to Nearest Grocery Store
E	45.00% - 54.99%	872	479	54.93%	0.72
F	55.00% & Greater	3,094	2,161	71.23%	0.29

Note: Analysis assumes an even distribution of population across census tracts.



King County
Department of
Natural Resources and Parks
**Wastewater Treatment
Division**

December 2012
G:\NWTR\Projects\LDW\Project\GIS\Seattle_Lake_Flood.mxd - Sarah Cross
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Park Area per Resident within the City of Seattle - 2010 US Census

City of Seattle

Category	Non-White Minority % Range	Total Population	Total Non-White Minority Population	% Non-White Minority Population	Park Area (SqFt)	Park Area per Resident (SqFt)
A	Below 15.00%	103,936	13,287	12.78%	35,954,230.50	345.93
B	15.00% - 24.99%	198,866	38,796	19.51%	70,163,258.10	352.82
C	25.00% - 34.99%	99,172	29,829	30.08%	32,044,977.69	323.13
D	35.00% - 44.99%	59,732	23,909	40.03%	36,961,861.72	618.79
E	45.00% - 54.99%	36,923	18,434	49.93%	11,779,919.68	319.04
F	55.00% & Greater	110,399	81,017	73.39%	29,488,014.01	267.10

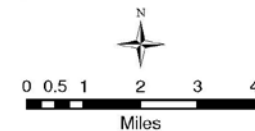
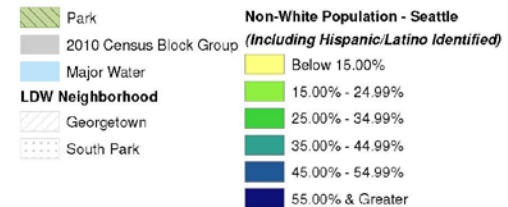
Georgetown

Category	Non-White Minority % Range	Total Population	Total Non-White Minority Population	% Non-White Minority Population	Park Area (SqFt)	Park Area per Resident (SqFt)
C	25.00% - 34.99%	558	156	27.96%	227,261.30	407.28
D	35.00% - 44.99%	729	289	39.64%	35,415.38	48.58

South Park

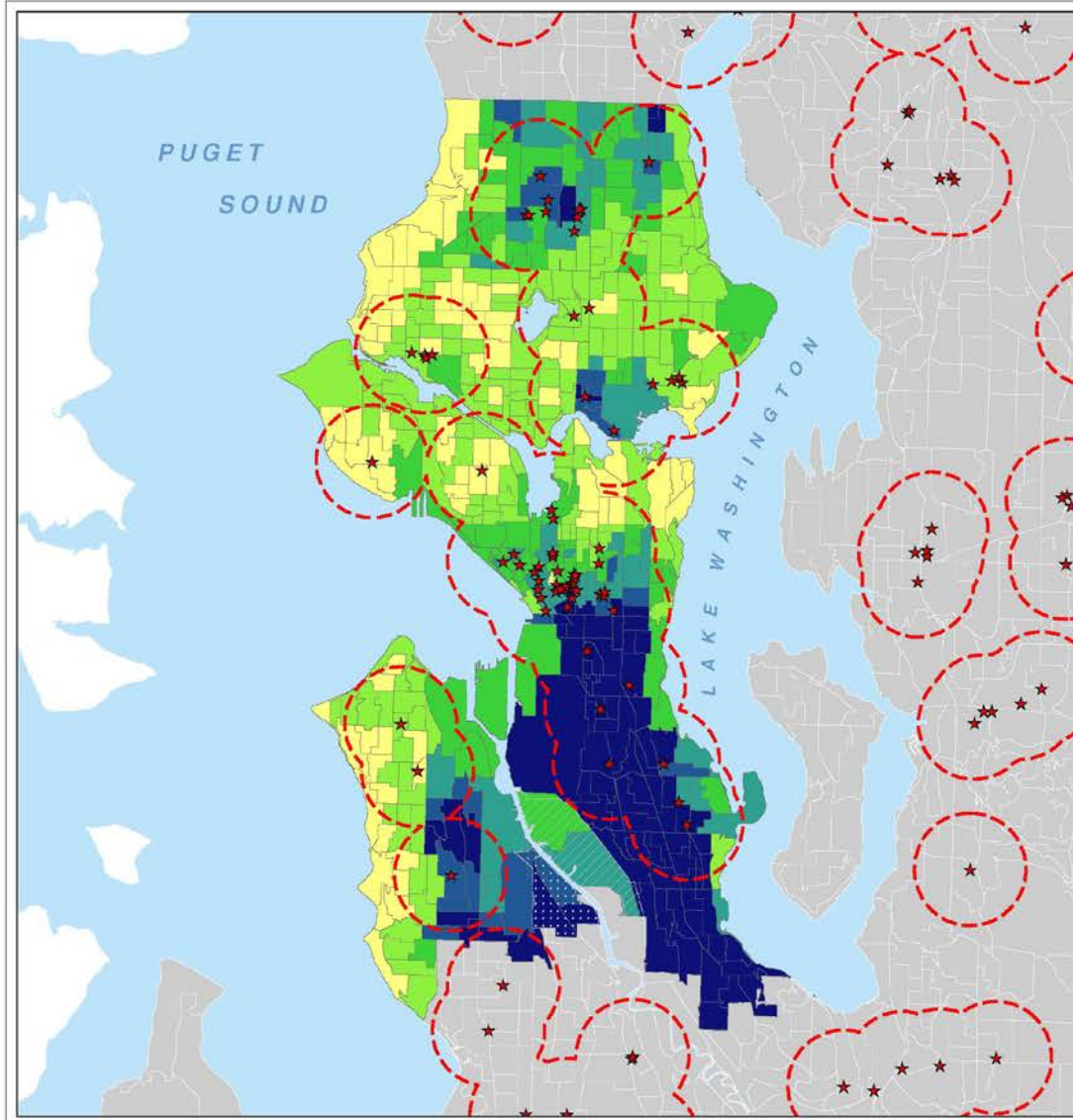
Category	Non-White Minority % Range	Total Population	Total Non-White Minority Population	% Non-White Minority Population	Park Area (SqFt)	Park Area per Resident (SqFt)
E	45.00% - 54.99%	872	479	54.93%	300,313.64	344.40
F	55.00% & Greater	3,034	2,161	71.23%	51,112.34	16.85

Note: Analysis assumes an even distribution of population across census tracts.



King County
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Natural Resources and Parks
Wastewater Treatment
Division

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Seattle Minority Population Within 1 Mile of a Medical Facility - 2010 US Census

City of Seattle

Category	Non-White Minority % Range	Total Population	Total Non-White Minority Population	Total Population Within 1 Mile of a Medical Facility	Total Non-White Minority Population Within 1 Mile of a Medical Facility	% Total Population Within 1 Mile of a Medical Facility	% Non-White Minority Population Within 1 Mile of a Medical Facility
A	Below 15.00%	103,936	13,287	61,266	8,023	38.93%	60.38%
B	15.00% - 24.99%	138,866	38,796	145,066	28,331	72.98%	73.59%
C	25.00% - 34.99%	99,172	29,829	80,095	24,252	80.76%	81.30%
D	35.00% - 44.99%	59,732	23,909	52,402	20,950	87.73%	87.62%
E	45.00% - 54.99%	36,923	18,454	29,172	14,339	79.01%	78.87%
F	55.00% & Greater	110,339	61,017	78,753	33,488	71.34%	68.49%

Georgetown

Category	Non-White Minority % Range	Total Population	Total Non-White Minority Population	Total Population Within 1 Mile of a Medical Facility	Total Non-White Minority Population Within 1 Mile of a Medical Facility	% Total Population Within 1 Mile of a Medical Facility	% Non-White Minority Population Within 1 Mile of a Medical Facility
C	25.00% - 34.99%	538	136	0	0	0.00%	0.00%
D	35.00% - 44.99%	729	259	0	0	0.00%	0.00%

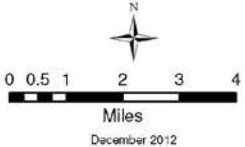
South Park

Category	Non-White Minority % Range	Total Population	Total Non-White Minority Population	Total Population Within 1 Mile of a Medical Facility	Total Non-White Minority Population Within 1 Mile of a Medical Facility	% Total Population Within 1 Mile of a Medical Facility	% Non-White Minority Population Within 1 Mile of a Medical Facility
E	45.00% - 54.99%	872	479	0	0	0.00%	0.00%
F	55.00% & Greater	3,034	2,151	0	0	0.00%	0.00%

Note: Analysis assumes an even distribution of population across census tracts.

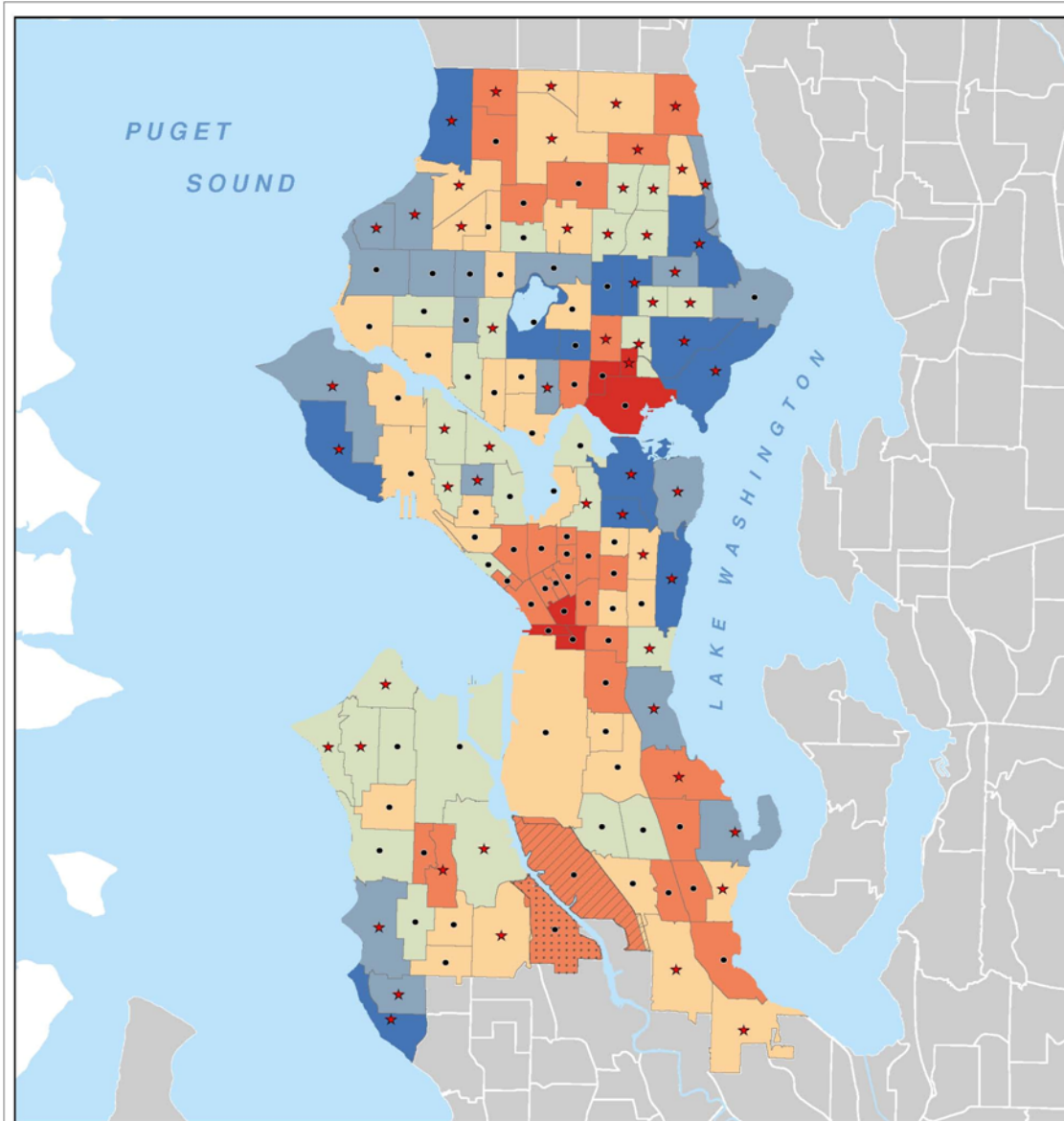
★ Medical Services (Includes Hospitals, Medic Units, Public Health Clinics, etc.)
 - - - 1 Mile Buffer
 2010 Census Block Group
 Major Water
 LDW Neighborhood
 Georgetown
 South Park

Non-White Population - Seattle (Including Hispanic/Latino Identified)
 Below 15.00%
 15.00% - 24.99%
 25.00% - 34.99%
 35.00% - 44.99%
 45.00% - 54.99%
 55.00% & Greater



King County
 Department of Natural Resources and Parks
Wastewater Treatment Division

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Forest Canopy & Seattle Median Household Income - American Community Survey 06-10

City of Seattle Forest Canopy: 35.25% Average

Category	Median Household Income in 2010 Inflation-Adjusted \$'s	Count Census Tract	Total Population	Total Non-White Population	% Non-White Population	Forest Canopy %	Average Forest Canopy %	Median Forest Canopy %
A	Below \$25,000	6	25,983	12,661	48.73%	21.61%	18.18%	9.58%
B	\$25,000 - \$49,999	31	146,071	68,883	47.16%	25.01%	23.09%	21.19%
C	\$50,000 - \$64,999	35	167,960	62,868	37.43%	27.74%	28.63%	26.28%
D	\$65,000 - \$79,999	29	133,130	35,155	26.51%	37.15%	39.36%	39.64%
E	\$80,000 - \$94,999	18	76,852	15,053	19.59%	43.33%	42.38%	41.43%
F	\$95,000 & Over	13	58,510	10,341	17.67%	58.33%	55.99%	58.20%

Georgetown

Category	Median Household Income in 2010 Inflation-Adjusted \$'s	Count Census Tract	Total Population	Total Non-White Population	% Non-White Population	Forest Canopy %	Average Forest Canopy %	Median Forest Canopy %
B	\$25,000 - \$49,999	1	1,287	445	34.58%	1.37%	1.37%	1.37%

South Park

Category	Median Household Income in 2010 Inflation-Adjusted \$'s	Count Census Tract	Total Population	Total Non-White Population	% Non-White Population	Forest Canopy %	Average Forest Canopy %	Median Forest Canopy %
B	\$25,000 - \$49,999	1	3,906	2,640	67.59%	1.38%	1.38%	1.38%

Forest Canopy (%)

- Under 35.25%
- ★ 35.25% and Over

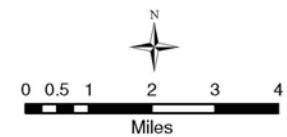
- Major Water
- All Other 2010 Census Tracts

LDW Neighborhood

- Georgetown
- South Park

Median Household Income (in 2010 Inflation-Adjusted \$'s)

- Below \$25,000
- \$25,000 - \$49,999
- \$50,000 - \$64,999
- \$65,000 - \$79,999
- \$80,000 - \$94,999
- \$95,000 & Over



King County
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Appendix C. Table 1. Metrics of Assessing Impacts of Lower Duwamish Cleanup Alternatives on Equity and Social Justice Determinants

Impact	Area near Lower Duwamish										
	Data to support score					Quantitative Score (score from -5 to 5)					
	Rationale	5C Short-term (construction)	5C Long-term (45 years)	5R Short-term (construction)	5R Long-term (45 years)	Units	5C Short-term (construction)	5C Long-term (45 years)	5R Short-term (construction)	5R Long-term (45 years)	Scoring Basis
1. Community economic development that supports local ownership of assets, including homes and businesses, and assures fair access for all to business development and business retention opportunities											
General discussion. Community and economic development in the Lower Duwamish Valley and greater area are influenced by the LDW cleanup directly (e.g., result in the hiring of contractors to complete the work) and indirectly (e.g., provide investment incentives/ disincentives in the area). Impacts split into short-term (ST) and long-term (LT).											
ST #1. Construction impacts on local economic activity	The public and private entities that perform cleanup will employ managers, engineers, construction workers, transportation workers and waste disposal companies to execute the cleanup. Metric selected from among many applicable metrics that are proportional to one another.	551		804		Total jobs	0.7		1.0		0 scores 0, 3,946 scores 5
ST #2. Business and government economic contraction	Local businesses and governments will have less money to spend other projects while funding the cleanup. Contraction (economic and jobs) assumed to be proportional to total cost of project. From ECONorthwest report.	\$290		\$470		Project cost (\$MM)	-3.1		-5.0		\$470 scores -5, \$0 scores 0
ST #3. Interference of the cleanup on local business will occur during construction	Interference of the cleanup on water-dependant businesses such as tribal fishing and shipping. Potential legal risk, cost uncertainty, and stigma of pollution will be an investment disincentive during construction. Faster and more efficient remediation encourages investment in the short-term. From ECONorthwest report.	7		17		Construction timeframe (years)	-2.1		-5.0		17 years scores -5, 0 years scores 0
LT #1. Economic growth driven by improved conditions following cleanup	Economic growth due to increased investment incentive due to lower legal risk, reduced cost uncertainty, and improved perception of the Lower Duwamish Valley. Additional stigma of pollution will occur as more contamination remains on site.		750,000		1,600,000	Dredge volume (cy)		2.3		5.0	0 scores 0, 1,600,000 scores 5
LT #2. Investment disincentive due to long-term goal of natural background	Long-term goal of natural background a huge disincentive to occupy/ manage property and meet future discharge permit conditions					BPJ		-5.0		-5.0	BPJ
LT #3. Gentrification	Positive economic and environmental change from cleanup two factors among many that will control gentrification					BPJ		0.0		0.0	BPJ - the cleanup is considered neutral with regard to gentrification due to multitude of other factors involved.
Subtotal of Economic Impacts Score (average)							-1.5	-0.9	-3.0	0.0	Average of above
2. Community and public safety that includes services such as fire, police, emergency medical services and code enforcement that are responsive to all residents so that everyone feels safe to live, work and play in any neighborhood of King County											
General discussion. The remedial alternatives improve community and public safety related to the health impacts of the alternatives.											
ST #1 Elevated fishing risks	Elevated seafood consumptions risks will persist during construction	7		17		Construction timeframe (years)	-2.1		-5.0		17 years scores -5, 0 years scores 0
ST #2 Impacts to community due to construction due to the presence of construction equipment, including air quality, traffic, noise, walk ability, etc.											
Expected number of accidents during remediation activities	Assumptions presented in FS Appendix L	23		49		Estimated number of accidents	-2.3		-5.0		49 accidents scores -5, 0 accidents scores 0
Air quality	Release of particulates from construction activities decreases air quality. Childhood asthma hospitalizations increase with emmissions.	25		50		PM10 (metric tons)	-2.5		-5.0		50 MT scores -5, 0 scores 0
Walkability	Assume that additional heavy construction will diminish walkability slightly in area					BPJ	-1.0		-2.0		BPJ
Traffic	Increase in traffic from construction activities	40,000		92,000		Truck trips (assume 18.7 cy (28 tons)/ truck)	-2.2		-5.0		92,000 trucks scores -5, 0 scores 0
Noise	Increase in noise from construction activities	7		17		Proportional to construction time	-2.1		-5.0		17 years scores -5, 0 years scores 0
Subtotal ST #2							-2.0		-4.5		
LT#1. Adult seafood consumption risk reduction	Predictive analysis indicates that adult excess cancer risk will be the same for both alternatives over the long-term. Both alternatives achieve significant risk reduction, but neither alternative meets risk goals.		2x10 ⁻⁵ HQ>1		2x10 ⁻⁵ HQ>1	One order of magnitude reduction from baseline risk but still above risk goal		2.0		2.0	All alternatives score equivalent - BPJ based on risk outcomes compared to goals.
LT#2. Direct contact risk reduction	Predictive analysis indicates that excess risk will be the same for both alternatives over the long-term. Both alternatives meet total risk goals.		<1x10 ⁻⁵ ; ≤1 HQ		<1x10 ⁻⁵ ; ≤1 HQ	Reduction of direct contact risks to meet goal		5.0		5.0	All alternatives score equivalent - current 10-4 risk scores 0; 1x10 ⁻⁵ goal scores 5.
LT #1. Beach play risk reduction	Predictive analysis indicates that excess risk will be the same for both alternatives over the long-term. Both alternatives meet total risk goals.		<1x10 ⁻⁵ ; ≤1 HQ		<1x10 ⁻⁵ ; ≤1 HQ	Reduction of direct contact risks to meet goal		5.0		5.0	All alternatives score equivalent - current 10-3 risk scores 0; 1x10 ⁻⁵ goal scores 5.
LT#2. Child seafood consumption risk reduction	Predictive analysis indicates that excess cancer risk will be the same for both alternatives over the long-term. Both alternatives achieve significant risk reduction, but neither alternative meets risk goals.		3x10 ⁻⁶ HQ>1		3x10 ⁻⁶ HQ>1	One order of magnitude reduction from baseline risk but still above risk goal		2.0		2.0	All alternatives score equivalent - current 10-4 risk scores 0; 1x10 ⁻⁵ goal scores 5.
Subtotal of community and public safety score (average)							-2.0	3.5	-4.5	3.5	Average of above
3. A law and justice system that provides equitable access and fair treatment for all											
General discussion. Either alternative would be conducted under all relevant local, state, and federal laws. The cleanup itself would not affect access to/ equity of the law and justice system for communities near the LDW.											
4. Early childhood development that supports nurturing relationships, high-quality affordable child care and early learning opportunities that promote optimal early childhood development and school readiness for all children											
General discussion. The remedial alternatives do not directly affect early childhood development. Indirect could be tied to health but not quantifiable and covered under community and public safety.											
5. Education that is high quality and culturally appropriate and allows each student to reach his or her full learning and career potential											
General discussion. The remedial alternatives do not directly affect education.											
6. Equity in county practices that eliminates all forms of discrimination in county activities in order to provide fair treatment for all employees, contractors, clients, community partners, residents and others who interact with King County											
General discussion. The project is not a County action and therefore not affected by County practices											
7. Food systems that support local food production and provide access to affordable, healthy, and culturally appropriate foods for all people											
General discussion. The cleanup will improve food systems for tribal and subsistence fisherman by reducing risks. However, river will not be restored to pre-industrial standards.											
ST #1 Elevated fishing risks and interference of construction on fishing/ gathering	Elevated seafood consumptions risks will persist during construction	7		17		Construction timeframe (years)	-2.1		-5.0		17 years scores -5, 0 years scores 0
LT #1. Seafood advisories	Predicted to be similar outcomes for both alternatives. Seafood advisories will persist for non-anadromous fish, but the amount of seafood that can be safely consumed will be higher.		seafood advisories will persist		seafood advisories will persist	BPJ based on predicted degree of seafood advisories		2.0		2.0	All alternatives score equivalent. BPJ based on seafood advisory outcomes compared to current conditions.
LT #2. Risk to subsistence fisherman (API)	Predictive analysis indicates that excess risk will be the same for both alternatives over the long-term. Both alternatives achieve significant risk reduction, but neither alternative meets risk goals.		5x10 ⁻⁵		5x10 ⁻⁵	One order of magnitude reduction from baseline risk but still above risk goal		4.0		4.0	All alternatives score equivalent - current 10-3 risk scores 0; 1x10 ⁻⁵ goal scores 5.
LT #3. Risk to tribal fisherman	Predictive analysis indicates that excess risk will be the same for both alternatives over the long-term. Both alternatives achieve significant risk reduction, but neither alternative meets risk goals.		2x10 ⁻⁴		2x10 ⁻⁴	One order of magnitude reduction from baseline risk but still above risk goal		2.0		2.0	All alternatives score equivalent - current 10-4 risk scores 0; 1x10 ⁻⁵ goal scores 5.
Subtotal							-2.1	2.7	-5.0	2.7	

Appendix C. Table 1. Metrics of Assessing Impacts of Lower Duwamish Cleanup Alternatives on Equity and Social Justice Determinants

Impact	Area near Lower Duwamish										
	Data to support score					Quantitative Score (score from -5 to 5)					
	Rationale	5C Short-term (construction)	5C Long-term (45 years)	5R Short-term (construction)	5R Long-term (45 years)	Units	5C Short-term (construction)	5C Long-term (45 years)	5R Short-term (construction)	5R Long-term (45 years)	Scoring Basis
8. Health and human services											
General discussion. As noted elsewhere, the cleanup has community health impacts. However, the cleanup does not affect health services.											
9. Healthy built and natural environments											
General discussion. Improving the natural environment is a major purpose of the cleanup. The feasibility study offers a number of predictions regarding the ecological health of the LDW.											
ST #1. GHG emissions	Emissions to the atmosphere and effect will be permanent	30,000	30,000	59,000	59,000	CO2 estimates (metric tons)	-2.5	-2.5	-5.0	-5.0	59,000 MT scours -5, 0 scores 0
ST #2. Habitat	High value habitat destroyed by remediation and requiring time to recover ecological functions	37		59		Habitat area shallower than -10 ft MLLW disturbed (dredging, capping) (acres)	-3.1		-5.0		59 acres scores -5, 0 acres scores 0
ST #3. Restoration period	Period when some elevation of ecological and human health risks occur compared to final outcomes	17		22		Same as time to achieve cleanup objectives (years)	-3.9		-5.0		22 years scores -5, 0 years scores 0
ST #4. Benthic organisms	Period when some area with benthic effects still occurring in waterway	6		11		time to achieve >98% area <SQ5 (years)	2.7		0.0		11 years scores 0, 0 years scores 5
ST #5. Wildlife	Period when elevated tissue levels remain of concern	7		17		time to achieve HQ<1 for river otter (years)	2.1		0.0		17 years scores 0, 0 years scores 5
LT #1. Benthic organisms	Protection of receptor of concern		meets SMS in long term		meets SMS in long term	predicted outcome compared to long-term goals		5.0		5.0	All alternatives score equivalent - BPJ based on risk outcomes compared to current conditions.
LT #2. Wildlife	Protection of receptor of concern		meets HQ goal in long term		meets HQ goal in long term	predicted outcome compared to long-term goals		5.0		5.0	All alternatives score equivalent - BPJ based on risk outcomes compared to current conditions.
Subtotal of Environmental Impacts Score (average)							-1.0	2.5	-3.0	1.7	Average of above
10. Housing for all people that is safe, affordable, high quality and healthy											
General discussion. The cleanup will not directly impact housing.											
11. Job training and jobs that provide all residents with the knowledge and skills to compete in a diverse workforce and with the ability to make sufficient income for the purchase of basic necessities to support them and their families											
General discussion. The cleanup will not directly impact job training, but general economic factors will affect long-term and short-term job creation. Scored assumed to be equivalent to determinant #1. The net economic effect of the cleanup is assumed to be negative because the cleanup will likely increase the cost of doing business near the LDW over											
Subtotal							-1.5	-0.9	-3.0	0.0	Scored equivalent to community economic development above
12. Neighborhoods that support all communities and individuals through strong social networks, trust among neighbors and the ability to work together to achieve common goals that improve the quality of life for everyone in the neighborhood											
General discussion. The cleanups do not directly address neighborhood and social networks. However, they do indirectly influence neighborhood and social networks: in the short-term the effect is largely negative, due to the effect of construction on the community, and in the long-term, the effect is likely to be positive due to increased safety and impr											
ST #1 Decline of social networks during construction	Multitude of impacts during construction	7		17		Construction timeframe (years)	-2.1		-5.0		17 years scores -5, 0 years scores 0
ST #2 Increase of social networks during construction	Community activism and networking could be at a high during the time that remediation is ongoing.	7		17		Construction timeframe (years)	2.1		5.0		17 years scores 5, 0 years scores 0
LT#1. Improved social networks generally improved following cleanup due to increased health of the river system. Including tribal spiritual dimension, empowerment, and cynicism.											
Improved social networks due to decreased fishing risk (e.g., tribal and subsistence fisherman)	Predictive analysis indicates that adult and child excess risk will be the same for both alternatives over the long-term. Both alternatives achieve significant cancer risk reduction, but neither alternative meets risk goals.		2x10 ⁻⁵ HQ>1		2x10 ⁻⁵ HQ>1	One order of magnitude reduction from baseline risk but still above risk goal		2.0		2.0	All alternatives score equivalent - current 10-3 risk scores 0; 1x10 ⁻⁵ goal scores 5.
Improved social networks due to decreased risk from beach play/ clamming/netfishing	Predictive analysis indicates that adult and child excess risk will be the same for both alternatives over the long-term. Both alternatives meet total risk goals.		<1x10 ⁻⁵ ; HQ<1		<1x10 ⁻⁵ ; HQ<1	BPJ based on total excess cancer risk		5.0		5.0	All alternatives score equivalent - current 10-4 risk scores 0; 1x10 ⁻⁵ goal scores 5.
Subtotal							0.0	3.5	0.0	3.5	Average of above
13. Parks and natural resources that provide access for all people to safe, clean and quality outdoor spaces, facilities and activities that appeal to the interests of all communities											
General discussion. The cleanups do not directly improve access to natural resources although they improve natural resources (addressed under healthy built and natural environment). The cleanups do not directly involve the construction of parks and access points, however, a more efficient cleanup leave resources to devote to other public projects wh											
14. Transportation that provides everyone with safe, efficient, affordable, convenient and reliable mobility options including public transit, walking, car pooling and biking											
General discussion. The cleanups do not directly address transportation. Construction could increase traffic in the area in the short-term, and diminish boat traffic. In the long-term improved infrastructure could improve road conditions for truck traffic and boat traffic, but would not affect neighborhood traffic. In the opposite way, resources spent on r											

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Appendix C. Table 1. Metrics of Assessment

Impact	Area outside Lower Duwamish										
	Rationale	Data to support score				Units	Quantitative Score (score from -5 to 5)				Scoring Basis
		5C Short-term (construction)	5C Long-term (45 years)	5R Short-term (construction)	5R Long-term (45 years)		5C Short-term (construction)	5C Long-term (45 years)	5R Short-term (construction)	5R Long-term (45 years)	
1. Community economic development that supports local businesses											
General discussion. Community and economic development impacts are expected to be positive for the area.											
ST #1. Construction impacts on local economic activity	From ECONorthwest report.	1,606		3,142		Total jobs	2		4		0 scores 0, 3,946 scores 5
ST #2. Business and government economic contraction	Outside vs. near the LDW considered proportionally the same (same metric and score)	\$290		\$470		Project cost (\$MM)	-3		-5		\$470 scores -5, \$0 scores 0
ST #3. Interference of the cleanup on local business will occur during construction	No effect away from the LD area.					n/a	0		0		n/a
LT #1. Economic growth driven by improved conditions following cleanup	No effect away from the LD area.					n/a		0		0	n/a
LT #2. Investment disincentive due to long-term goal of natural background	No effect away from the LD area.					n/a		0		0	n/a
LT #3. Gentrification	No effect away from the LD area.					n/a		0		0	n/a
Subtotal of Economic Impacts Score (average)							-0.4	0	-0.3	0	Average of above
2. Community and public safety that includes services such as fishing and recreation											
General discussion. The remedial alternatives improve conditions for fishing and recreation.											
ST #1 Elevated fishing risks	No effect away from the LD area.					n/a	0		0		n/a
ST #2 Impacts to community due to construction due to remediation activities											
Expected number of accidents during remediation activities	No effect away from the LD area.					n/a	0		0		n/a
Air quality	No effect away from the LD area.					n/a	0		0		n/a
Walkability	No effect away from the LD area.					n/a	0		0		n/a
Traffic	No effect away from the LD area.					n/a	0		0		n/a
Noise	No effect away from the LD area.					n/a	0		0		n/a
Subtotal ST #2							0	0	0	0	n/a
LT#1. Adult seafood consumption risk reduction	No effect away from the LD area.					n/a		0		0	n/a
LT#2. Direct contact risk reduction	No effect away from the LD area.					n/a		0		0	n/a
LT #1. Beach play risk reduction	No effect away from the LD area.					n/a		0		0	n/a
LT#2. Child seafood consumption risk reduction	No effect away from the LD area.					n/a		0		0	n/a
Subtotal of community and public safety score (average)							0	0	0	0	Average of above
3. A law and justice system that provides equitable access to justice											
General discussion. Either alternative would be conducted in a fair and equitable manner.											
4. Early childhood development that supports nurturing and positive relationships											
General discussion. The remedial alternatives do not directly impact early childhood development.											
5. Education that is high quality and culturally appropriate											
General discussion. The remedial alternatives do not directly impact education.											
6. Equity in county practices that eliminates all forms of discrimination											
General discussion. The project is not a County action and does not impact equity.											
7. Food systems that support local food production and access to healthy food											
General discussion. The cleanup will improve food system conditions.											
ST #1 Elevated fishing risks and interference of construction on fishing/ gathering	No effect away from the LD area.					n/a	0		0		n/a
LT #1. Seafood advisories	No effect away from the LD area.					n/a		0		0	n/a
LT #2. Risk to subsistence fisherman (API)	No effect away from the LD area.					n/a		0		0	n/a
LT #3. Risk to tribal fisherman	No effect away from the LD area.					n/a		0		0	n/a
Subtotal							0	0	0	0	Average of above

Appendix C. Table 1. Metrics of Assessment

Impact	Area outside Lower Duwamish										
	Rationale	Data to support score				Units	Quantitative Score (score from -5 to 5)				Scoring Basis
		5C Short-term (construction)	5C Long-term (45 years)	5R Short-term (construction)	5R Long-term (45 years)		5C Short-term (construction)	5C Long-term (45 years)	5R Short-term (construction)	5R Long-term (45 years)	
8. Health and human services											
General discussion. As noted elsewhere, the cleanup has											
9. Healthy built and natural environments											
General discussion. Improving the natural environment											
ST #1. GHG emissions	Outside vs. near the LDW considered proportionally the same (same metric and score)	32,000		62,000		CO2 estimates (metric tons)	-3		-5		62,000 MT scours -5, 0 scores 0
ST #2. Habitat	No effect away from the LD area.					n/a	0		0		n/a
ST #3. Restoration period	No effect away from the LD area.					n/a	0		0		n/a
ST #4. Benthic organisms	No effect away from the LD area.					n/a	0		0		n/a
ST #5. Wildlife	No effect away from the LD area.					n/a	0		0		n/a
LT #1. Benthic organisms	No effect away from the LD area.					n/a		0		0	n/a
LT #2. Wildlife	No effect away from the LD area.					n/a		0		0	n/a
Subtotal of Environmental Impacts Score (average)							-0.5	0	-1.0	0	Average of above
10. Housing for all people that is safe, affordable, high quality											
General discussion. The cleanup will not directly impact											
11. Job training and jobs that provide all residents with											
General discussion. The cleanup will not directly impact j the short-term and long-term.											
Subtotal							0	0	0	0	n/a
12. Neighborhoods that support all communities and inc											
General discussion. The cleanups do not directly addressved river conditions. On the flip side, community social networks may be improved during construction due to an influx of resources for educational and informational purposes.											
ST #1 Decline of social networks during construction	No effect away from the LD area.					n/a	0		0		n/a
ST #2 Increase of social networks during construction	No effect away from the LD area.					n/a	0		0		n/a
LT#1. Improved social networks generally improved											
Improved social networks due to decreased fishing risk (e.g., tribal and subsistence fisherman)	No effect away from the LD area.					n/a		0		0	n/a
Improved social networks due to decreased risk from beach play/ clamming/netfishing	No effect away from the LD area.					n/a		0		0	n/a
Subtotal							0	0	0	0	Average of above
13. Parks and natural resources that provide access for											
General discussion. The cleanups do not directly improveich could have an indirect effect.											
14. Transportation that provides everyone with safe, ef											
General discussion. The cleanups do not directly addressmediation will diminish the public funds available for other projects. In total, the effect of the cleanup on transportation is considered nominal.											

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